Citation:

Watt K, Purdie DM, Roche AM, McClure RJ. Risk of injury from acute alcohol consumption and the influence of confounders. *Addiction.* 2004 Oct;99(10):1262-73. Erratum in: *Addiction.* 2004 Oct;99(10):1366.

PubMed ID: 15369564

Study Design:

Case-Control Study

Class:

C - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To quantify the relationship between acute alcohol consumption and risk of injury, in the context of other potential confounding factors.

Inclusion Criteria:

Cases:

- patients aged 15 years and over treated at the emergency department for an injury (i.e. all conditions codeable using ICD-9 between 800 and 995)
- injury sustained less than 24 hour prior to presentation
- permanent residential address within the geographical boundaries of the Gold Coast region

Controls:

- matched to cases on gender, age within 5-year bands, except for 15-17 year olds, and local suburban area, as well as day and time of cases' injury

Exclusion Criteria:

None specifically mentioned.

Description of Study Protocol:

Recruitment

- Eligible injury cases admitted to hospital approached for participation and provided informed consent
- Telephone controls: random digit dialing used until appropriate control identified

- Neighborhood controls (additional control for 43 cases): occupants in houses approached on the same day, as telephone controls (between 4 and 9 p.m. in the 3 days following the matched cases' injury), starting with the street adjacent to the cases' street and working outwards until an appropriate control identified

Design: Case-control study

Blinding used (if applicable): not applicable

Intervention (if applicable): not applicable

Statistical Analysis

- The relationship between the three measures of alcohol consumption and the risk of injury were considered in separate models, due to collinearity between the alcohol variables
- Crude odds ratios (ORs) with 95% confidence intervals (CI) were calculated to estimate the relative risk of injury associated various factors known or hypothesized to influence injury
    - if significantly associated, they were then included in a conditional logistic regression model with each measure of acute alcohol consumption
    - if no longer significant, they were removed
    - if ORs of other variables changed more than 10%, the variable was not included in the model. These included: annual income, employment, education, private health insurance, activity, location, and companions at the time of injury
- Only the risk-taking variables of sensation seeking and risk-perception were associated significantly with injury risk, and were the only two measures included in the analyses.

Data Collection Summary:

Timing of Measurements

- Data collected quarterly over a 12 month period (Summer, Autumn, Winter and Spring, with two spring data collection periods)
- Each data collection period consisted of two consecutive weekends with eligible patients presenting to the hospital from 6 p.m. Friday night until 10 p.m. Sunday night
- Controls were contacted and interviewed by telephone between 4 and 9 p.m. in the 3 days following their matched case's hospital presentation

Dependent Variables

- Risk of injury

Independent Variables

- Acute alcohol consumption
    - *any alcohol use in 24 hours prior*: categorized as no alcohol use, alcohol use in the 6 hours prior, and alcohol use in the 6 to 24 hours prior to time of injury
    - *quantity of alcohol consumption in the 6 and 24 hours prior to time of injury* (total number of standard drinks): from self-reported alcohol consumption in the 6 to 24 hours prior to injury (quantity, size of container(s) from which alcohol was consumed, brand name, strength of alcohol consumed etc:
        - no alcohol:
        - low risk: females $\leq$ 4 drinks; males $\leq$ 6 drinks:

        - risky: females: 4 to 6 drinks; males: 6 to 10 drinks
        - high risk: females: 6+ drinks; males: 10 +
    - *beverage preference*: beer (including cider); spirits, wine; combination
    - *drinking patterns:* how often alcohol consumed and total number of standard rinks usually consumed per week
        - non-drinker
        - low risk: females: < 2; males: <4
        - risky: females: 2-4; males 4-6
        - high risk: females: 4+; males: 6+ standard drinks
- Breath alcohol sample

Control Variables

- Substance use: reported use of prescribed and over-the counter medication and illicit substance use in the 6 and 24 hours prior to time of injury
- Risk-taking behavior:
    - risk-taking impulsivity scale and a modified version of Zuckerman's sensation seeking scale;
    - frequency of engaging in 11 behaviors commonly defined as risky in the Australian population; mean scores categorized into two similar sized groups reflecting high and low risk -frequency; -perception; and -enjoyment

Description of Actual Data Sample:

Initial N: N=727

Attrition (final N): N=543 interviewed; N=488 in analyses (males: N=311; females: N=177)

(94 refused, 37 too severely injured to be interviewed; 6 medically unable; 44 discharged prior to being approached) (non-participants were more likely to present with poison/overdose complaints, present with an injury to the head/neck region, and present between midnight and 6 a.m.

Age: ranged from 15 to 60+ years

Ethnicity: not specified

Other relevant demographics: none specified

Anthropometrics none given

Location: Gold Coast of Australia

Summary of Results:

Key Findings:

Consumption of alcohol in the 6 to 24 hours prior to time of injury:

- Consumption of any alcohol in the 6 hours prior to time of injury significantly increased the risk of injury occurrence (OR=2.13, 95% CI: 1.2-3.0) compared to not having drunk alcohol in the previous day, whereas the risk of injury for people who drank between 6 and 24 hours prior to time of injury was not significantly different from those who did not consume

alcohol.
    - Usual alcohol consumption patterns negatively confound the alcohol-injury relationship: when included in the analyses, ORs increased
- A high score on sensation seeking was associated with reduced injury risk compared with a low-score (OR=0.38, 95% CI: 0.2-0.9)
    - When risk taking was controlled for, the risk of injury from drinking any alcohol in the 6 hours prior to time of injury increased to 3.73 (95% CI: 1.5-9.5) and risk from drinking in the 6 to 24 hour prior to time injury increased to 2.41 (95% CI: 1.1-5.0)

Consumption of alcohol in the 6 hours prior to time of injury:

- Consumption of alcohol at levels above guidelines for short-term health (per occasion: 40 g+ for women; 60 g+ for men) increased injury risk by a factor of 2.5 compared with those who did not drink any alcohol in the 6 hours prior to time of injury (OR=2.41, 95%CI: 1.1-5.2)
- The effect of quantity of alcohol on injury risk was reduced with risk-taking behavior was considered ((OR=0.39, 95% CI: 0.2-0.9).
- Controlling for all demographic and situational variables, as well as usual alcohol consumption, substance use, and risk-taking, there was an injury risk of 1.9% for males (OR=1.019, 95% CI: 0.963-1.079) and 65.7% for females (OR=1.657; 95% CI: 0.75-3.660) for every 10 grams of alcohol consumed, although not significant
- Drinking beer (OR=1.86, 95%CI: 0.9-3.9), spirits (OR=3.05, 95% CI: 1.1-82), or a combination (OR=3.16, 95% CI: 1.1-8.8) of beverages increased risk of injury compared to not drinking any alcohol in the 6 hours prior to injury; drinking wine reduced injury risk (not significant)

Other Findings

- There were significant interactions between use of prescription medication in the day prior to injury and any alcohol use in the 6 hours prior to time of injury, as well as use of over-the-counter medication in the day before injury and alcohol use in the 6-24 hours prior to injury ($P<0.05$).
- A high score on sensation seeking was associated significantly with a reduction in risk of injury compared to a low score; adding to the model reduced risk to injury from drinking beer, wine or spirits compared to not drinking.
- The risk to injury from drinking a combination of beverages compared with not drinking alcohol increased substantially.
- There was an inverse association between regular consumption of any amount of alcohol (low-risk or risky/high-risk) and risk of injury. However, substance use and risk-taking behavior did impact OR for risk of injury when analyzing for quantity and type of alcohol.

Author Conclusion:

Acute alcohol consumption significantly increased the risk of injury, even with consideration of situational and other risk factors. The relationship between alcohol and injury appears confounded by usual drinking patterns, risk-taking behavior and substance use.

Reviewer Comments:

No mention of validity of the assessment for alcohol intake. Authors note the following limitations:

- *Only patients able to be interviewed were included as cases in the study, thereby excluding more seriously injured patients*
- *Cases were only sampled on weekends*

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions		
1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	N/A
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	N/A

Validity Questions		
1.	**Was the research question clearly stated?**	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	**Was the selection of study subjects/patients free from bias?**	???
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	???
2.4.	Were the subjects/patients a representative sample of the relevant population?	???
3.	**Were study groups comparable?**	Yes
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	Yes

3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	Yes
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	Yes
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	N/A
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	Yes
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	N/A
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	Yes
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	Yes
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	N/A
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	Yes
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	Yes

6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	N/A
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	???
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	N/A
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	???
7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	Yes
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A

8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**	Yes
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**	Yes
10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes